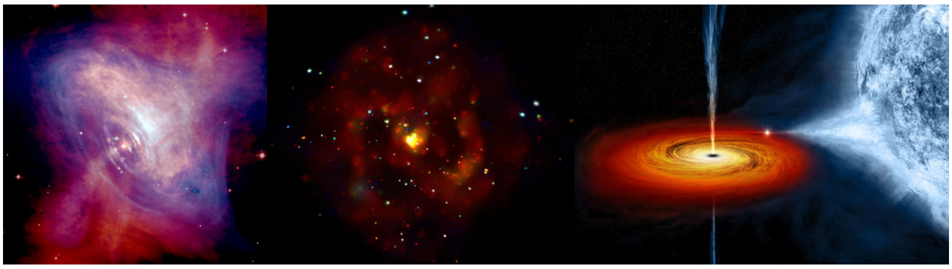

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Probing thermonuclear flares on neutron stars and their interaction with accretion

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Intense X-ray bursts (type-I bursts) originating from unstable thermonuclear conflagration, are observed from the surface of neutron star low-mass X-ray binaries (LMXBs) and they offer a promising tool to constrain the equation of state of the supra-nuclear matter at the neutron star core and to probe gravity in strong regime near the compact object. Recent observations show the burst spectra to deviate from the commonly used Planckian spectrum. Broad-band spectral studies of type I X-ray bursts can put strong constraints on the physics of burst spectra as well as their interaction with the environment. We present the results obtained from the broad-band time-resolved spectroscopy of 15 thermonuclear bursts detected simultaneously from the neutron star atoll source 4U 1636–536 using the Large Area X-ray Proportional Counter (LAXPC) and Soft X-ray Telescope (SXT) onboard AstroSat. We indeed observe an excess in the broadband burst spectra near the peak of the bursts. We discuss the implications of our results in the light of the re-emission/reprocessing of the photons by the accretion disc/corona or scattering of the photons in the neutron star atmosphere or the enhanced persistent emission due to the Poynting–Robertson drag. We further invetigate the 51 thermonuclear X-ray bursts observed from 4U 1636–536 by the Neutron Star Interior Composition Explorer (NICER) over the course of a 3 yr monitoring campaign. The time-resolved spectroscopy of theses bursts also show strong soft excess. We also present time-resolved spectral analysis of five X-ray bursts simultaneously observed by NICER and AstroSat, which confirm the softer excess with greater precision. This kind of study may provide a better understanding of the burst–accretion interaction and how the bursts influence the overall accretion process contributed by the accretion disc as well as the corona.

Presentation Type

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